We'll be starting in just a few minutes….

Tell us…

What topics are you interested in for future

Peer Exchange calls?

Please send your response to the call organizers via the question box.

Better Buildings®
U.S. DEPARTMENT OF ENERGY

Better Buildings Residential Network
Peer Exchange Call Series

What Does Electrification at Scale Look Like?

April 28, 2022

U.S. DEPARTMENT OF ENERGY

Agenda and Ground Rules

- Agenda Review and Ground Rules
- Opening Poll
- Residential Network Overview and Upcoming Call Schedule
- Featured Speakers
  - **Dr. Luis Aguirre-Torres,** City of Ithaca
  - **Anne Evens,** Elevate Energy
  - **Keith Dennis,** Beneficial Electrification League (BEL)
- Open Discussion
- Closing Poll and Announcements

Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

The views expressed by speakers are their own, and do not reflect those of the Dept. of Energy.

Join the Network

Member Benefits:

- Recognition in media, social media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- One-on-One brainstorming conversations

Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year, or equivalent.

Upcoming Calls (2nd & 4th Thursdays):

- *5/12: Training, New Technology, and Workforce Recruitment and Retention Challenges*
- *5/26: The Impact of Insurance and Mortgages on Energy Efficiency – Resilience, New Markets, and More*
- *6/09: The State of Home Labeling and Residential Energy Efficiency*

Peer Exchange Call summaries are posted on the Better Buildings website a few weeks after the call

For more information or to join, for no cost, email bbresidentialnetwork@ee.doe.gov, or go to energy.gov/eere/bbrn & click Join

Dr. Luis Aguirre-Torres
City of Ithaca

U.S. DEPARTMENT OF ENERGY

CITY OF ITHACA
GREEN NEW DEAL
AN EQUITABLE TRANSITION TO CARBON NEUTRALITY BY 2030

A Blueprint for Equitable City-Wide Decarbonization

Dr. Luis Aguirre-Torres,
Director of Sustainability, City of Ithaca

April 28th, 2022.

CITY OF ITHACA
108 East Green Street Ithaca, New York 14850-5690
MAYOR'S OFFICE

SVANTE L. MYRICK, MAYOR

Telephone: 607-274-6501
Email: mayor@cityofithaca.org
Fax: 607-274-6526

ITHACA GREEN NEW DEAL

Carbon-neutral Community-wide by 2030

- The Ithaca Green New Deal was adopted unanimously by the City of Ithaca Common Council on June 5, 2019
- The Green New Deal addresses climate change, economic inequality and racial injustice

Ithaca Green New Deal Goals

- Achieve carbon-neutrality community-wide by 2030
- Meet the electricity needs of City government operations with 100% renewable electricity by 2025
- Reduce emissions from City vehicle fleet by 50% by 2025
- Ensure benefits are shared among all local communities to reduce historical social and economic inequities
- Facilitate a comprehensive public engagement process

Actions to Achieve the Goals

- Create an action plan in 2020 to achieve these goals, and update regularly
- Annually report progress towards goals
- Adopt a Green Building Code for new buildings in 2019
- Adopt a Green Building Code for existing buildings by 2021
- Assign additional staff to implement the plan

Stay Engaged

- For IGND updates, visit http://www.cityofithaca.org/642/Green-New-Deal

Decarbonization in Economic Terms

(Not modelled; Illustration only)

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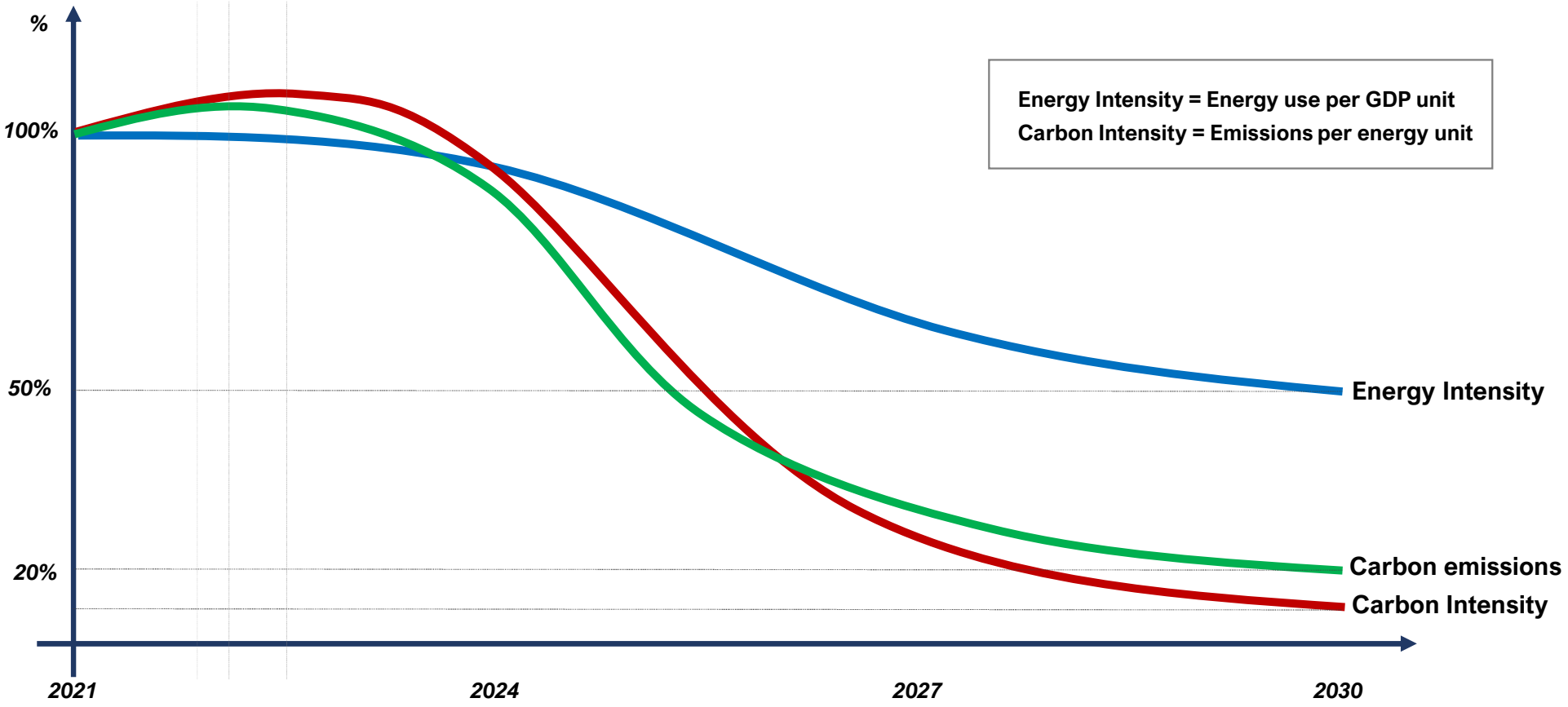
AN EQUITABLE TRANSITION TO CARBON NEUTRALITY BY 2030



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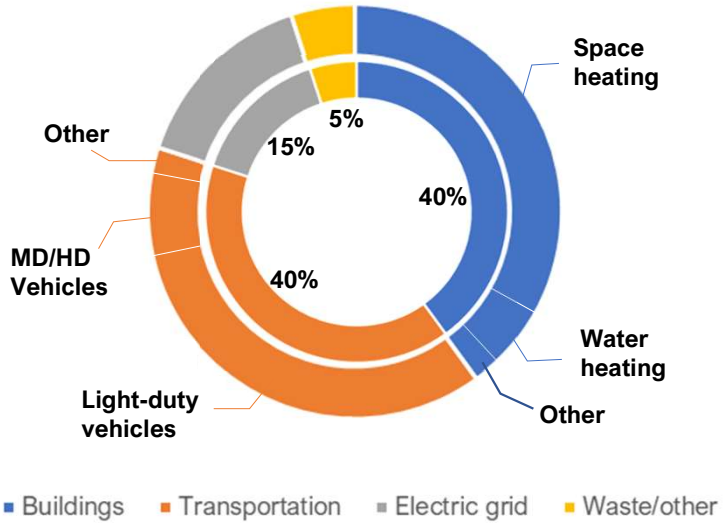
AN EQUITABLE TRANSITION TO CARBON NEUTRALITY BY 2030

By 2030: Achieve 100% Carbon Neutrality

- Most emissions come from energy use inside buildings, transportation and the electric grid.
  - A small amount from waste and other sources.
- Necessary to implement cross-cutting strategies to implement long-term emissions reduction programs:
  - Energy efficiency.
  - Decarbonization.
  - Electrification.
  - Carbon capture and sequestration.

Estimated City emissions:
400,000 Mt CO2e



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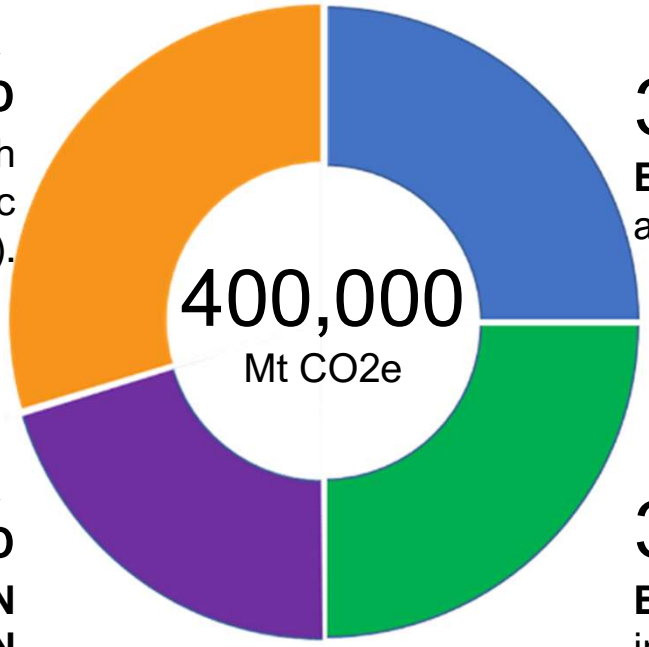
AN EQUITABLE TRANSITION TO CARBON NEUTRALITY BY 2030

Strategies for Emissions Reduction

(estimated emissions)

20%

Can be reduced through **DECARBONIZATION** of the electric grid (deployment of solar).



30% can be reduced through **ELECTRIFICATION** of thermal loads and light- and medium-duty vehicles.

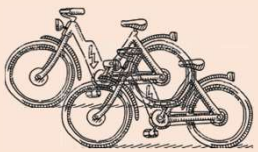
20%

Can be reduced through **CARBON CAPTURE AND SEQUESTRATION** and low carbon fuels (such as hydrogen).

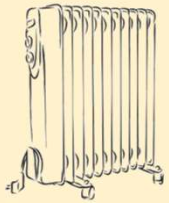
30% can be reduced through **ENERGY EFFICIENCY** measures, including building retrofitting and the introduction of smart controls and grid interacting technologies.

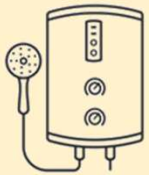
CO2 Emissions Reduction

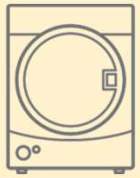
Energy Efficiency (30%)

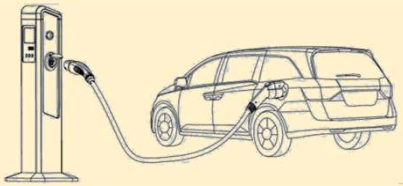


Electrification (30%)

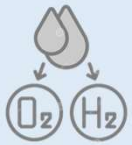




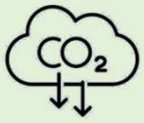


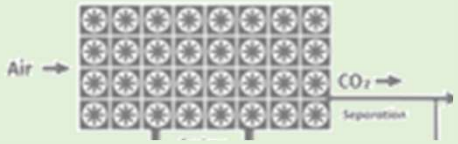


Decarbonization (20%)



Carbon capture and sequestration (20%)





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Climate Action Plan

Democratic Engagement

Workforce Development

Resilient and reliable infrastructure

City-wide Energy management

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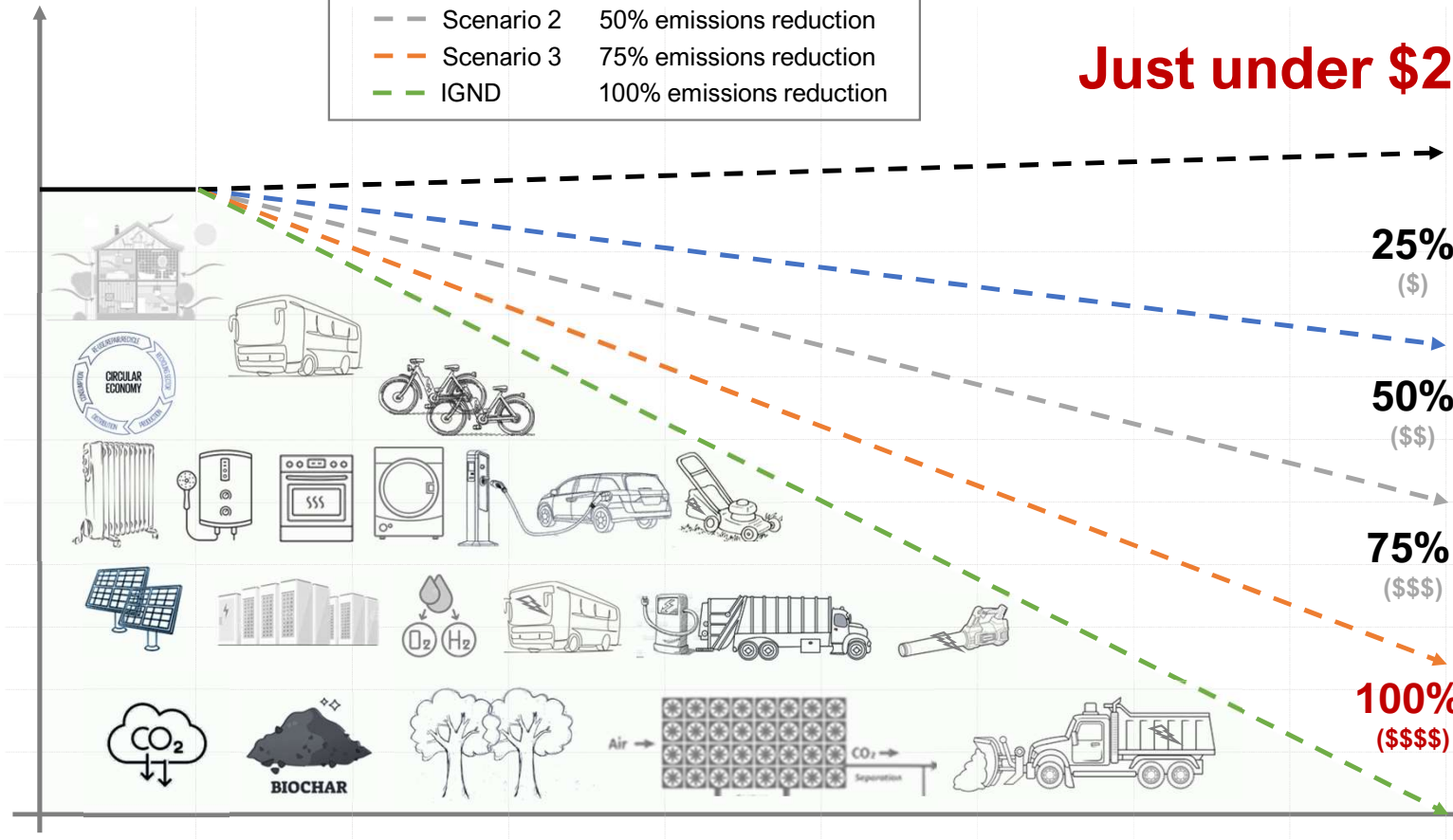
CCS: Carbon Capture and Sequestration

BAU	0% emissions reduction
Scenario 1	25% emissions reduction
Scenario 2	50% emissions reduction
Scenario 3	75% emissions reduction
IGND	100% emissions reduction

CO2 emissions

Just under $2 billion.



2022 2023 2024 2025 2026 2027 2028 2029 2030

Business as usual

25% ($)
- 35% Energy Efficiency
- 35% electrification
- 25% decarbonization
- 0% CCS

50% ($$)
- 75% Energy Efficiency
- 75% electrification
- 50% decarbonization
- 0% CCS

75% ($$$)
- 100% Energy Efficiency
- 100% electrification
- 100% decarbonization
- 0% CCS

100% ($$$$)
- 100% Energy Efficiency
- 100% electrification
- 100% decarbonization
- 100% CCS

2022 - IGND Ongoing Programs

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Key to the Success of the Program

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1. Increase **economic sophistication**.
2. Address industry **fragmentation**.
3. Create **economies of scale** to achieve savings in equipment/parts/labor.
4. Achieve **bulk purchasing** power.
5. Develop a **skilled workforce**.
6. Maximize **efficiency** and **consolidate** government incentives.
7. Develop mechanisms to **unlock financial flows**.
8. **Risk mitigation** strategies implemented at the local level.
9. Achieve **financial inclusion** and **climate justice**.
10. Enable the **aggregation and securitization** of energy assets.

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GREEN NEW DEAL

AN EQUITABLE TRANSITION TO CARBON NEUTRALITY BY 2030

For more information:

laguirretorres@cityofithaca.org

April 2022.

Anne Evens
Elevate Energy

U.S. DEPARTMENT OF ENERGY

ELEVATE

Equitable Multifamily Electrification

April 2022

Background on Elevate

Elevate has retrofitted over 100,000 units of affordable housing over the past 20 years.

Our programs span energy and health retrofits, solar, demand response and dynamic pricing, and contractor and workforce development.

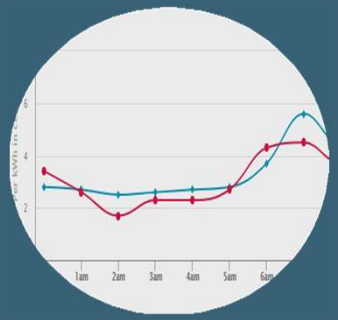
We are developing an implementation model to electrify and decarbonize affordable housing as quickly and as equitably as possible.

Four Pillars of Decarbonizing Existing Buildings

Energy Efficiency

Electrification

Renewable Electric Supply



Managed Electricity Loads

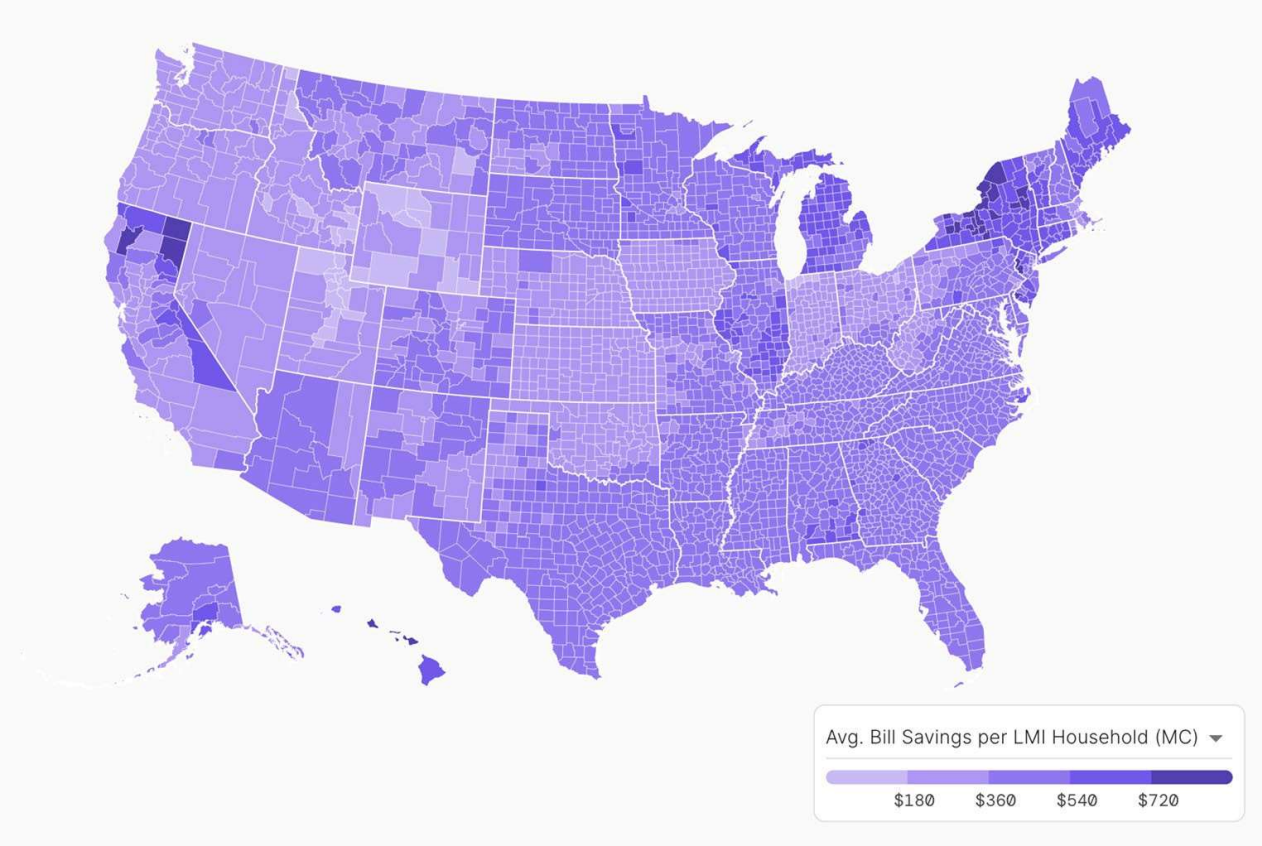
Electrification, Climate Crisis, and Equity

We cannot achieve zero emissions unless we electrify lower-income households.

42% Residential emissions

45.6M LMI households

250M Appliances represented



Source: Rewiring America

All Families Need to Be Included in This Transition

Central Cooling in Homes

Single family

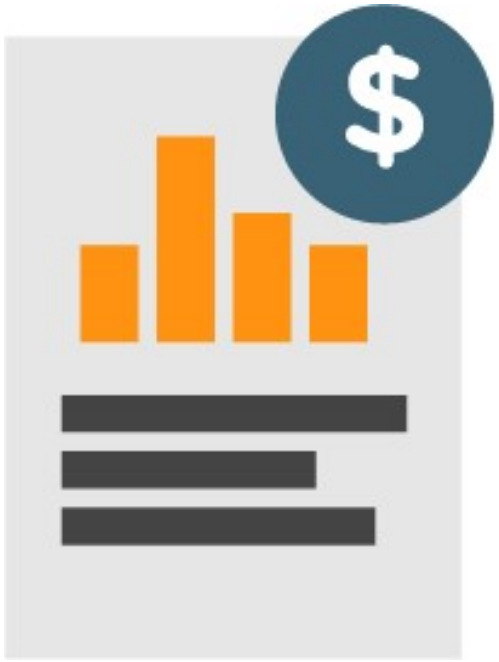
41%

Multifamily

33%

We're experiencing extreme heat waves, yet under 50% of affordable housing units have central cooling.

Gas appliances add to poor indoor air quality, impacting the most vulnerable.



Electrification can reduce energy costs by $377 per household -- an estimated savings of $17.2B/yr.

Elevate Launched the Building Electrification Program in 2020

Our program began with a focus on electrifying homes across affordable, multifamily properties in Chicago, Madison, and Detroit.

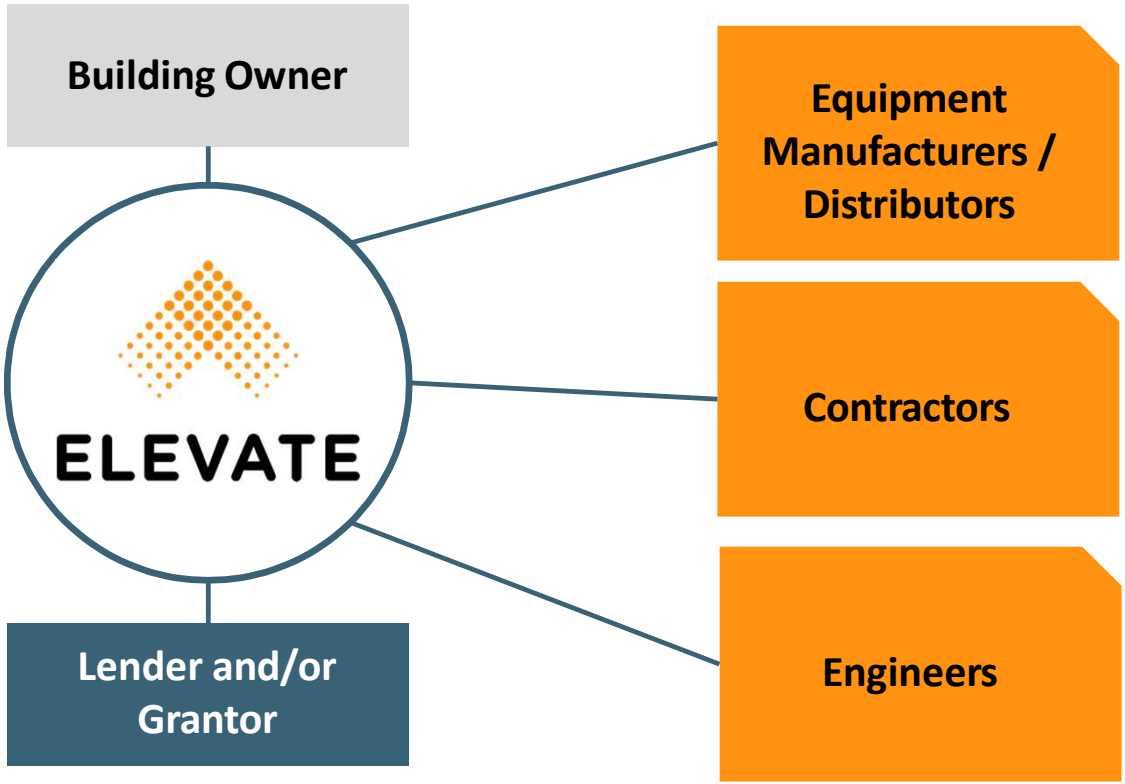
Program highlights:

- Installation of heat pumps, electric stoves, and on-site solar
- Reduces carbon emissions, generates tenant savings, and improves indoor air quality
- Accelerates the market through partnerships with manufacturers and diverse contractors

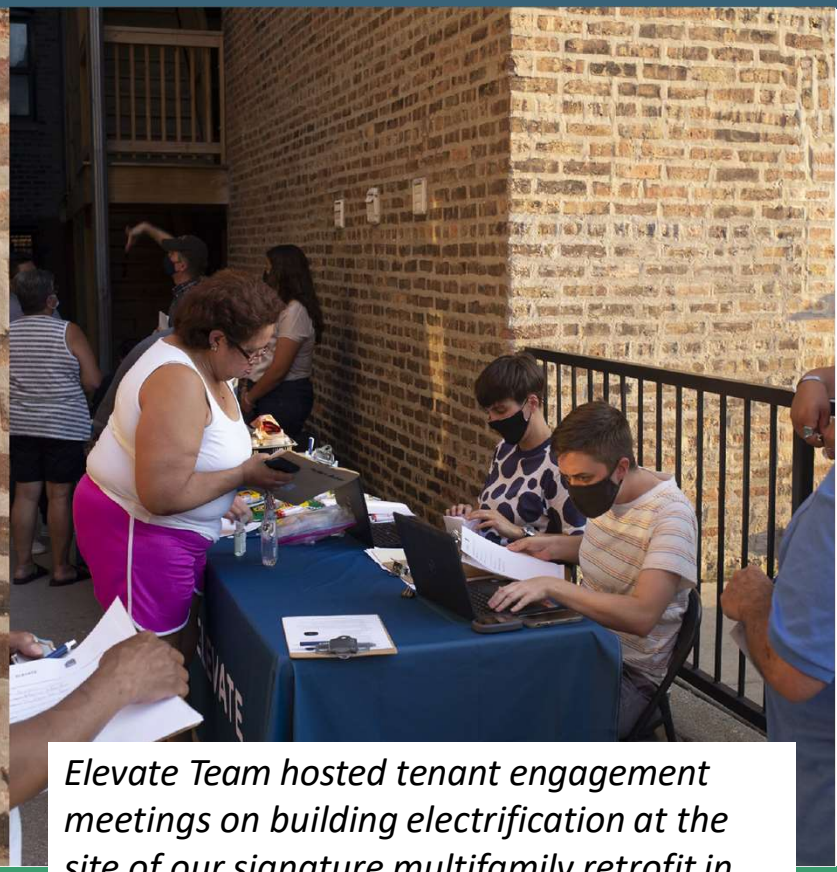
Process flow:

1. Building owner shares information via survey to determine fit
2. Elevate creates a preliminary upgrade overview and cost estimate
3. Building owner signs indication of interest
4. Elevate completes an assessment, creates a project plan and finalizes grant support
5. Elevate manages the installation of equipment and ongoing support

Electrification Model



Electrification Retrofits Can Lower Carbon Emissions, Generate Energy Savings, & Improve Resident Health



Elevate Team hosted tenant engagement meetings on building electrification at the site of our signature multifamily retrofit in Chicago – La Paz Apartments.

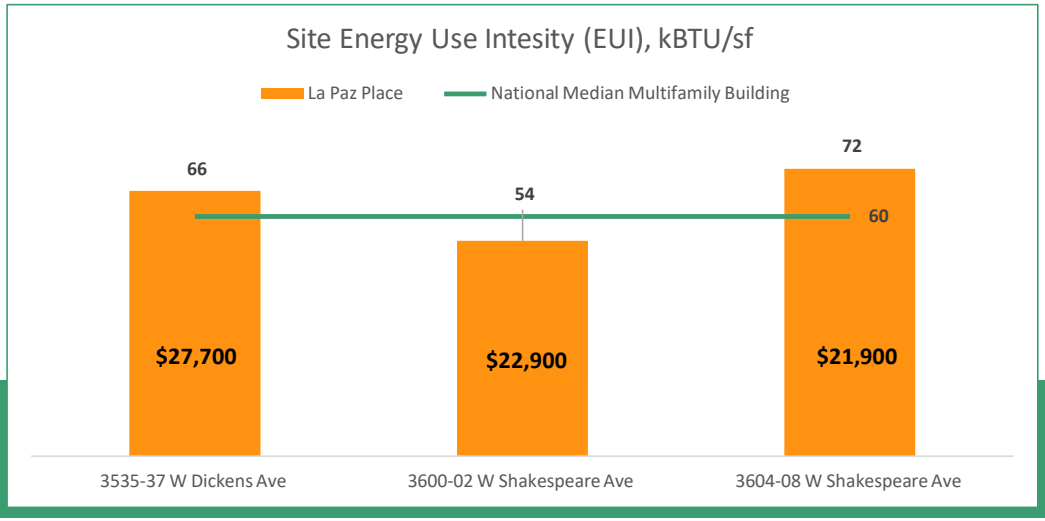
Project Case Study – Bickerdike La Paz

- 3-building property totaling 44 units on Northwest side of Chicago.
- It is a masonry courtyard-style building, which is typical of the pre-War vintage.
- Of the 44 units, 31 are affordable to families at 50% Area Median Income (AMI) or $44,550, and 13 are affordable at 30% AMI ($26,730).
- Owner provides housing development and preservation, economic empowerment, leadership development, and tenant organizing.
- In unit: gas stoves and furnaces
- Common: gas hot water and dryers

Energy Efficiency Strategies

Energy Efficiency

- In 2013, all 3 properties upgraded their air sealing and insulation of roof cavities/attics
- In 2015-2016, all 3 properties installed aerators and showerheads
- Similar energy performance to the national median
- Energy costs are relatively similar



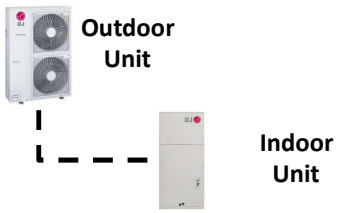
Electrification Strategies

Electrification

- Upgrade all building equipment and systems that use natural gas:
  - Space Heating → heat pumps
  - Water Heating → heat pumps
  - Appliances (stoves, clothes dryers)→ all-electric
- Upgrade electrical service to withstand new/added electrical loads
  - Most unit panels can accommodate the heat pump and stove, but some units require panel upgrades for backup electric heating
  - The common account will require an added 200A panel in the basement to support the heat pumps for air and water heating

Technologies

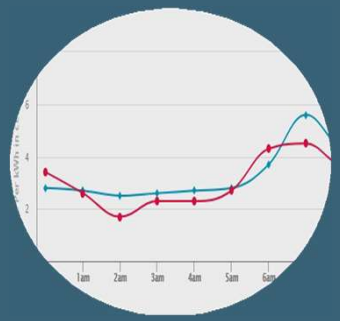
- **Space heating and cooling:** High-efficiency individual heat pumps for each unit provide heating in winter and cooling in summer
  - Average coefficient of performance (COP) of 200-300% versus 70-80% efficiency furnaces
- **Water heating**: provides ‘free’ basement cooling. Simplified installation, no flues or additional roof/wall penetrations. Longer life (15 vs 10 years) and average COP of 250%
- **Stoves**: ‘last mile’ to eliminate tenant gas service, thereby eliminating the high fixed charges.
- **Laundry**: traditional electric high-capacity dryer



Solar & Demand Response

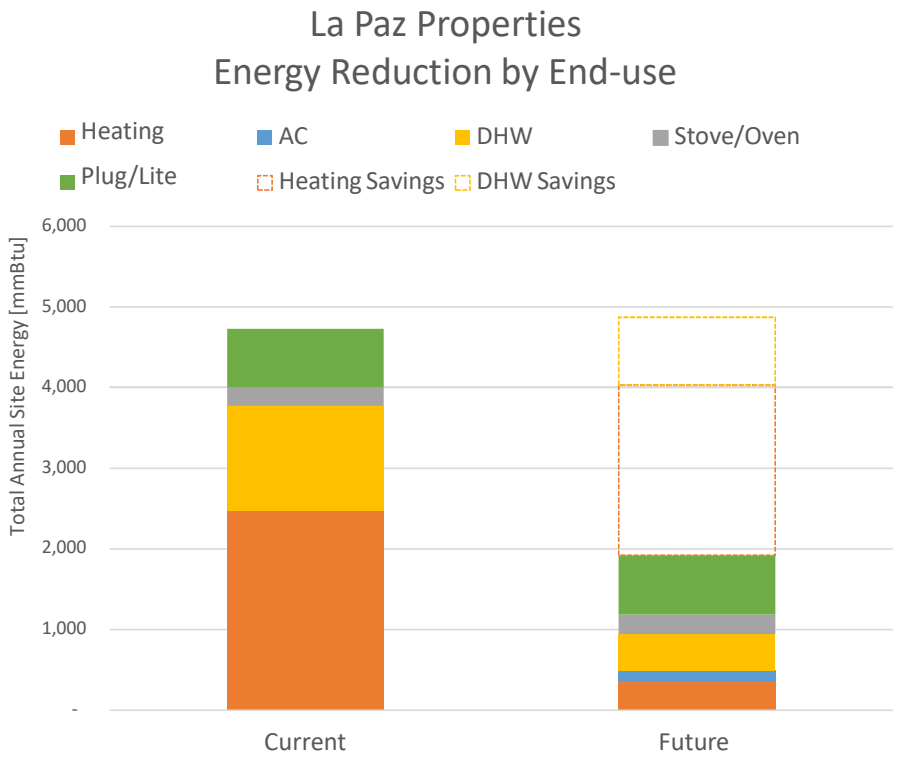
- Solar PV on all 3 rooftops
- Electrification will save 3% on annual utility costs, and the addition of solar brings total cost savings to 15% annually
- Demand response, particularly grid-enabled water heating, is being discussed with ComEd and the owner

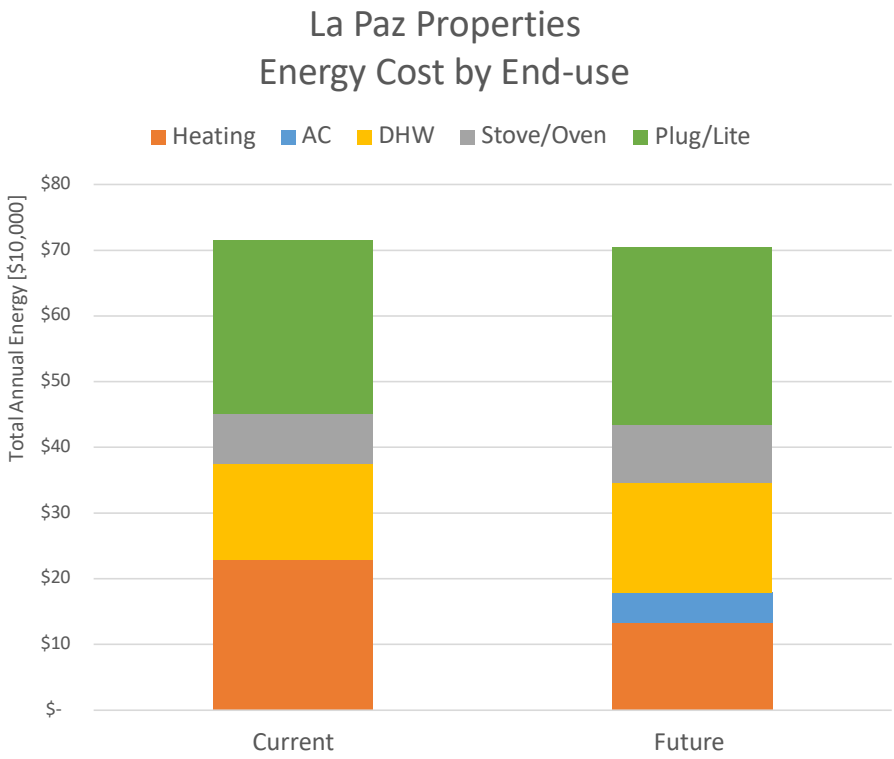
Renewable Electric Supply



Managed Electricity Loads

PROJECTED UTILITY CONSUMPTION AND COST

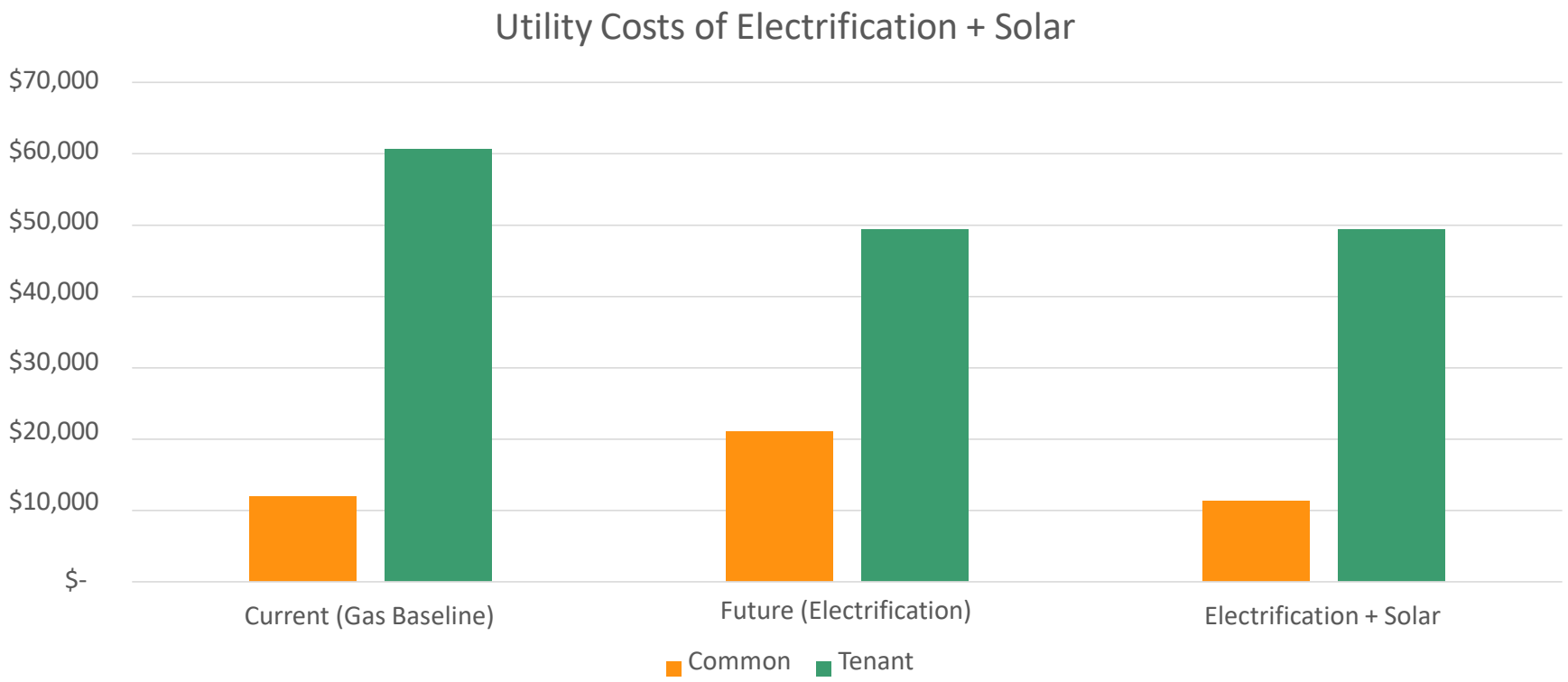




DATA BASED+ db HMS

ELEVATE ENERGY
Smarter energy use for all

Electrification + Solar



Policy is Advancing – Let's Build the Delivery System

Affordable housing can be the tip of the spear in market transformation.

- Significant federal and state funding could offer a historic opportunity to inject public capital into building electrification.
- We need effective distribution and implementation systems that keep BIPOC communities at the forefront.

Senator Martin Heinrich (D-NM) announces "Electrifying America's Future" resolution at a May press conference.

Contact information

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Keith Dennis
Beneficial Electrification League

U.S. DEPARTMENT OF ENERGY

BEL Residential Electrification Context

Beneficial Electrification League

What is “Beneficial Electrification?”

Beneficial Electrification (BE) includes the application of electricity to end-uses where doing so satisfies at least one of the following conditions, without adversely affecting the others:

- Saves consumers money over time;
- Benefits the environment and reduces greenhouse gas emissions;
- Improves product quality or consumer quality of life;
- Fosters a more robust and resilient grid

Beneficial Electrification programs are a valuable opportunity to engage both electric utilities and environmental groups in the effort to identify solutions that work well for the end-use consumer, local communities and the environment.

NOT an “Electrify Everything” Concept

Follow The Beneficial Electrification League on LinkedIn

BEL's Mission and Vision

Vision

Our vision of the future is for beneficial electrification to be universally accepted as a necessary strategy to meet economic, consumer and environmental goals.

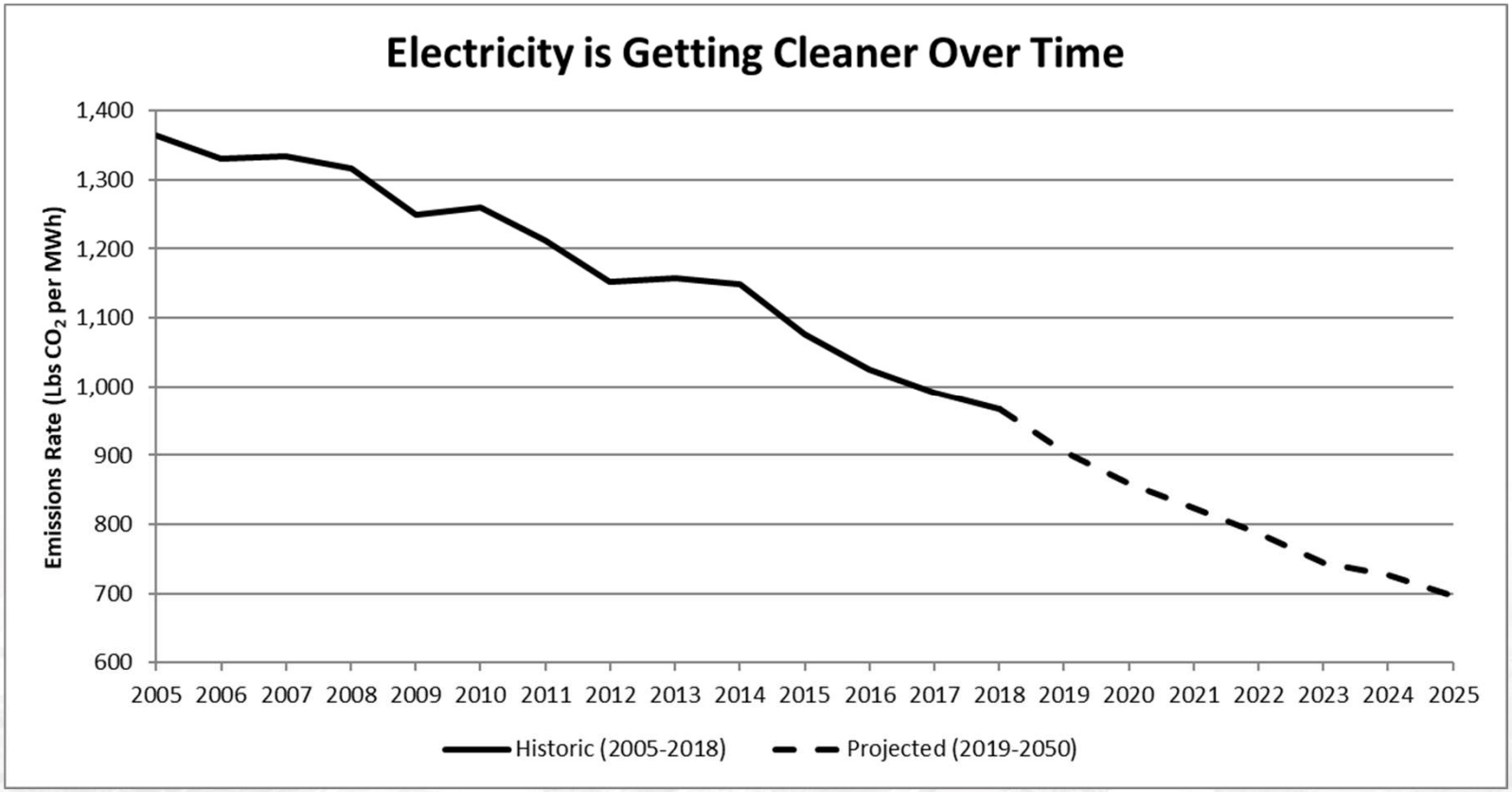
Mission

To increase understanding on the benefits of electrification by promoting the market acceptance of beneficial electrification, educate policy makers on the value, benefits and tools of Beneficial Electrification and serve as a conduit and facilitator of BE resources.

Technology & Interest Is Beyond EVs

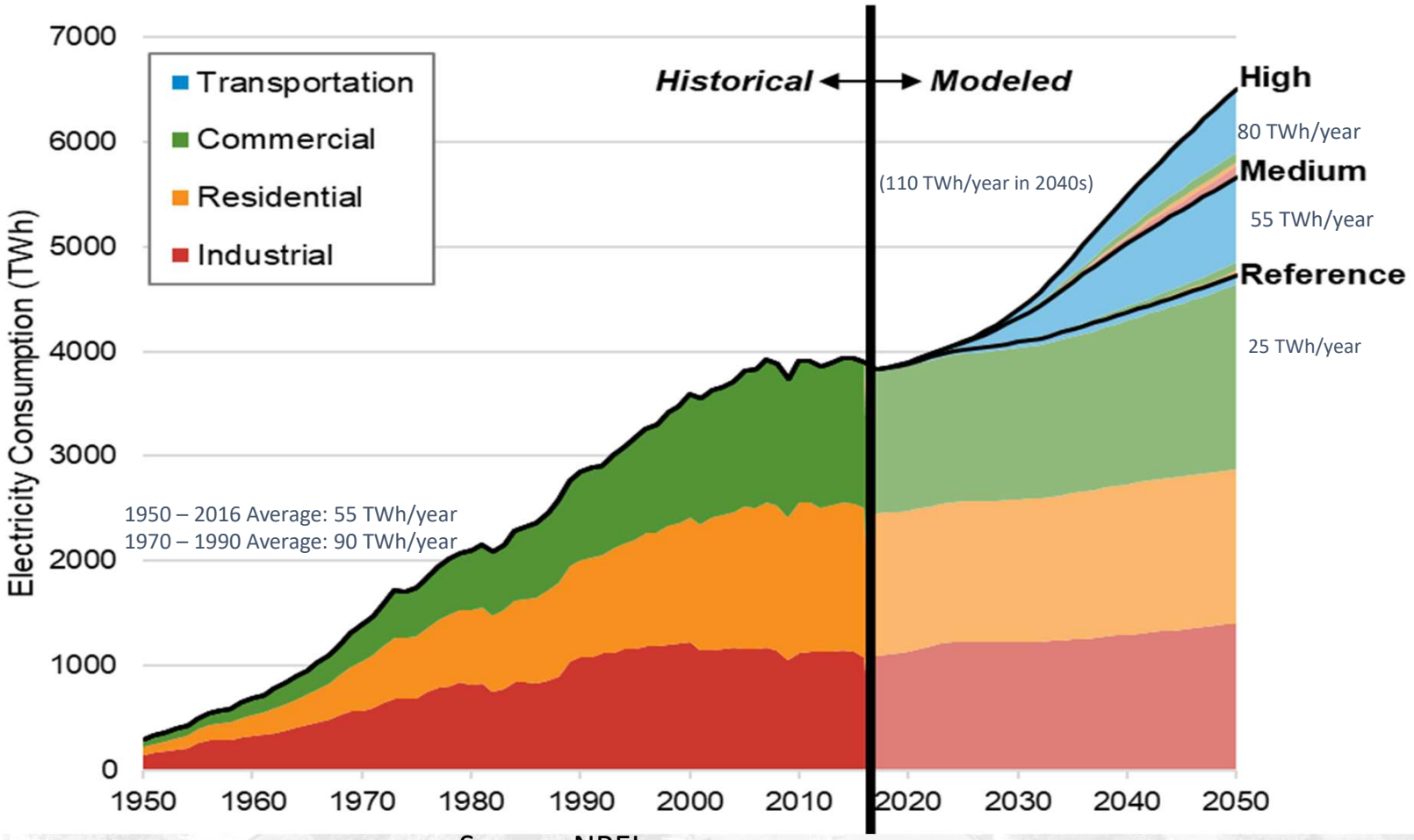
… Wait, There's More?…

Opportunity to Improve "Emissions Efficiency"



By virtue of being plugged into the grid, the environmental performance of electric devices improves over time.

Electric Load Growth Could Be Significant



Source: NREL

Strategy – Applied RDD&D

North Carolina Electric Cooperatives and White Rock Farms – Waste lagoon pumping system

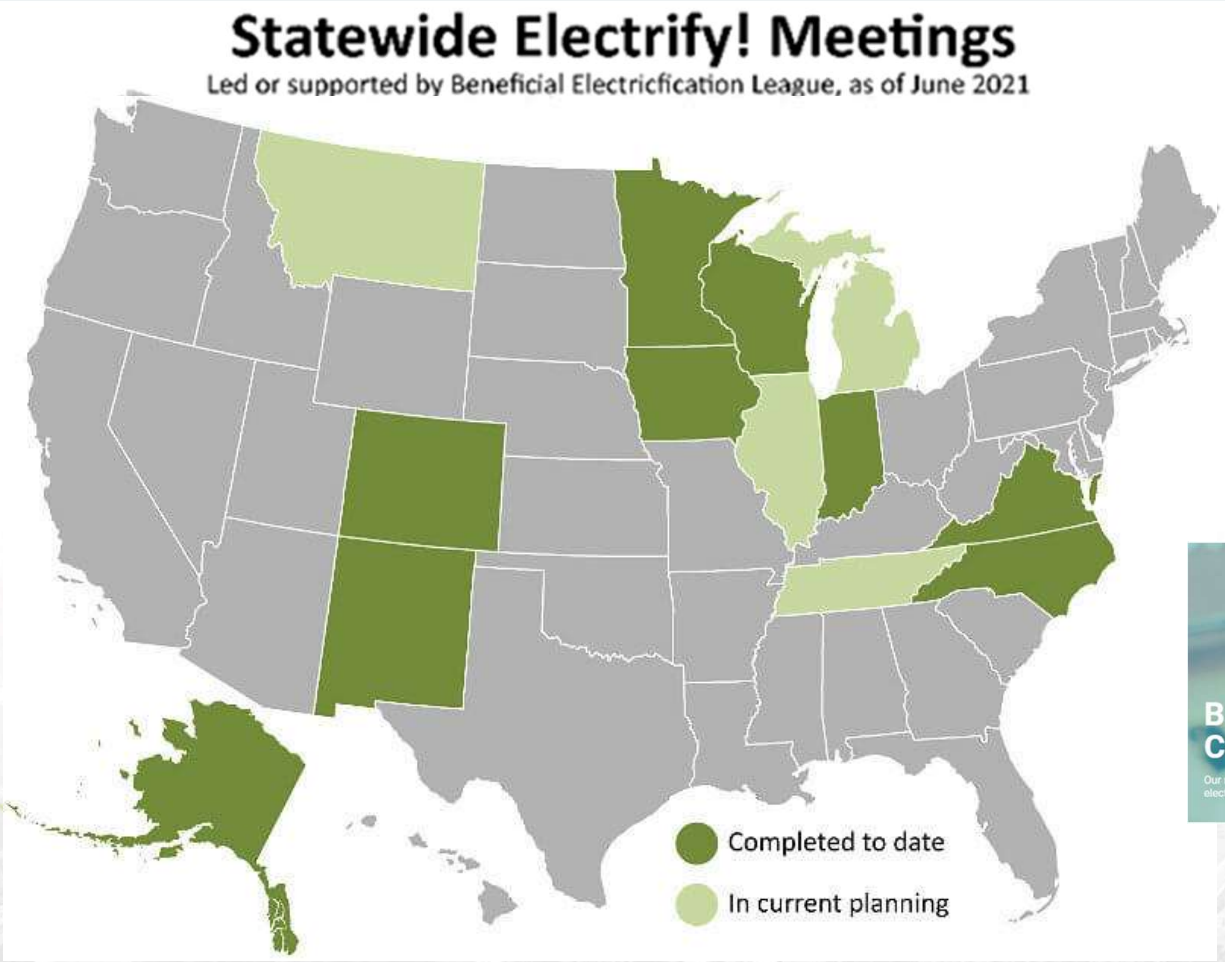
Winneshiek Energy District (Iowa) – Home energy audits and electrification coaching

Hoosier Energy (Indiana) – Poultry barn heat recovery

Central Electric Cooperative (South Dakota) - eUTVs

Beartooth Electric Cooperative (Montana) – Electric manufactured homes with cold climate mini-split heat pumps

Strategy – Empowering and facilitating state-based collaboration



Love Electric

Beneficial Electrification

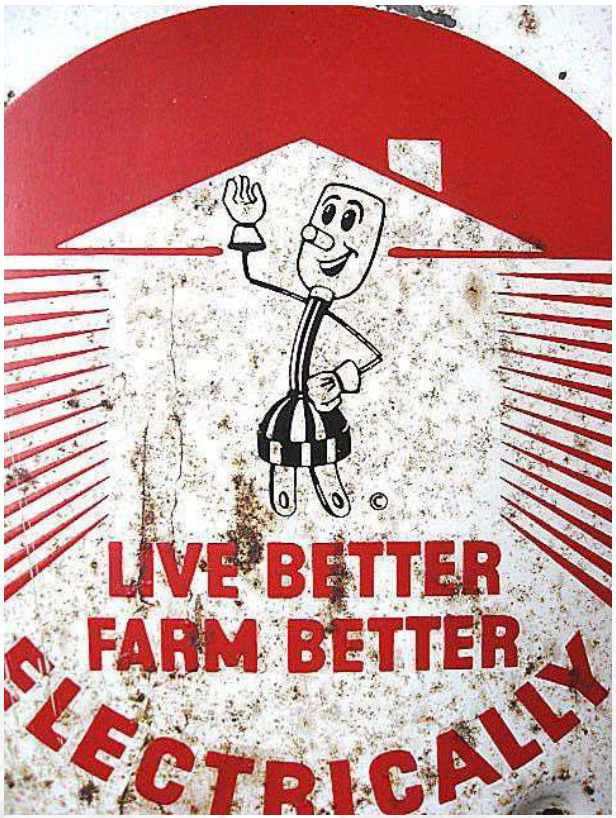
Beneficial Electrification

We've done this kind of thing before!

"IT'S LIKE HAVING A PARTY EVERY DAY when you live in a Gold Medallion Home," say Kenneth and Marilyn White as they celebrate Mrs. White's birthday with daughters Patty, 8, Christie, 12, and Cheryl, 9.

"We're having more fun now that we've moved into a modern total electric home"

Beneficial Electrification



Beneficial Electrification

Beneficial Electrification

Benefits of Electricity:

- **Improved quality of life**
- **24/7 “servant” & “hired hand”**
- **Convenient**
- **Safe & Clean**
- **Efficient**
- **Economical**
- **Environmentally beneficial***

Beneficial Electrification

Beneficial Electrification

Weatherization-Electrification (WE) Together

- The best time to electrify, or at least consider electrification is during upgrades
- Low-income residents have a difficult time with up-front costs- an equity concern
- WAP Innovation and Enhancement is looking at “electrification-ready” home
- BEL is kicking off a project with Well Fargo on this topic – stay tuned for more info
- WAP funded at $3.5B under IIJA

IIJA Funding - EECBG $500M

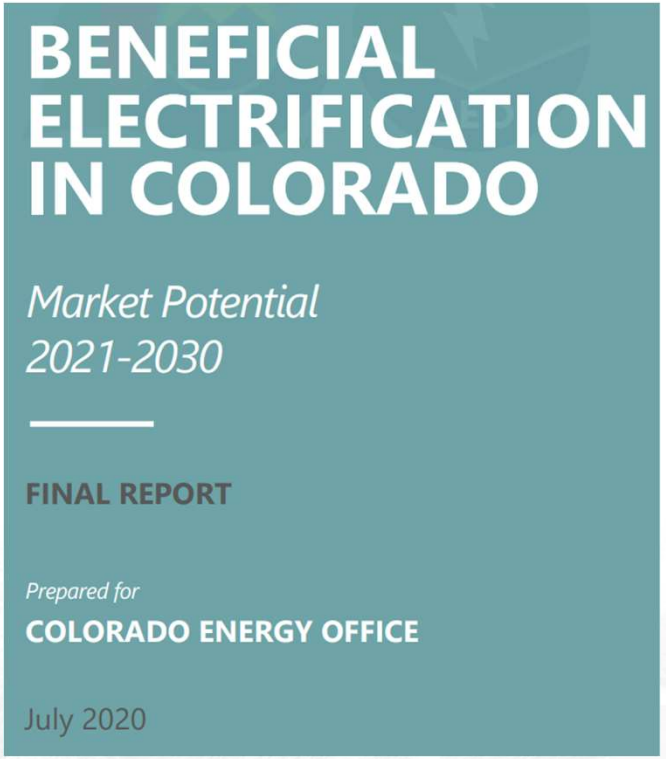
The purpose of the EECBG Program is to assist eligible entities (States, units of local government, and Indian tribes) in creating and implementing strategies to:

- Reduce fossil fuel emissions in a manner that is environmentally sustainable and, to the maximum extent practicable, maximize benefits for local and regional communities;
- Reduce the total energy use of the eligible entities; and
- Improve energy efficiency in the building sector, the transportation sector, and other appropriate sectors.

(Beneficial Electrification as defined by BEL achieves this – BE achieves BTU energy reduction)

Suggestions Categories 1-2

- Category 1 - Development and implementation of an energy efficiency and conservation strategy
- Category 2 - Retaining technical consultant services for strategy— inclusion measurement methods



Model should include planning for beneficial electrification and developing methods to measure benefits of beneficial electrification programs

Suggestions Category 3

Category 3 - Conducting residential and commercial building energy audits

Model should include energy audits that incorporate beneficial electrification – it is most cost-effective to switch to electric products (including heating, cooling, stoves, and equipment) while upgrading building envelope and performing other on-site work.

www.be-league.org

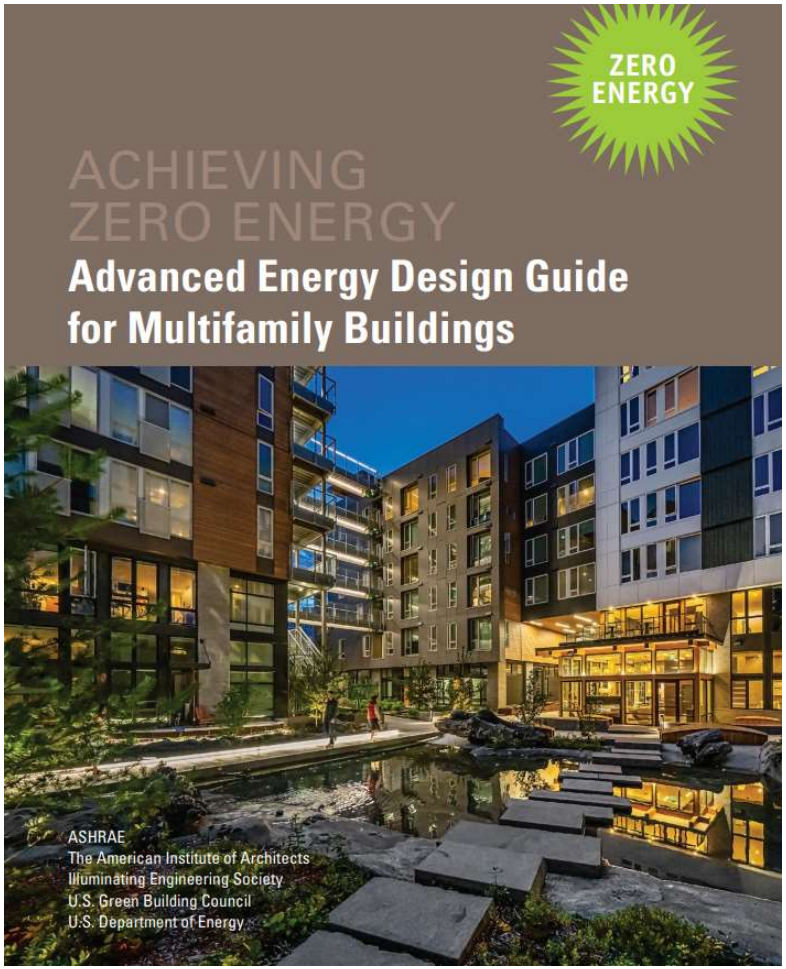
Explore the Residential Program Solution Center

Resources to help improve your program and reach energy efficiency targets:

- Handbooks - explain *why* and *how* to implement specific stages of a program.
- Quick Answers - provide answers and resources for common questions.
- Proven Practices posts - include lessons learned, examples, and helpful tips from successful programs.
- Technology Solutions NEW! - present resources on advanced technologies, **HVAC** & **Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.

https://rpsc.energy.gov

Zero Energy Advanced Energy Design Guide for Multifamily Buildings



This Guide demonstrates that zero energy multifamily buildings are attainable and provides design teams with strategies for achieving energy savings goals that are financially feasible, operationally workable, and readily achievable.

The Guide offers direction for designing and constructing zero energy multifamily buildings in all climate zones through recommendations, strategies, and solution packages.

Now available for free download through ASHRAE https://www.ashrae.org/technical-resources/aedgs/zero-energy-aedg-free-download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